GEODE-CM: A State-Transition Framework for Clinical Management

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Medical knowledge can be represented by clinical guidelines of various types, ranging from simple edicts to multiple page protocols.[1] These guidelines are often detailed about suggesting or dictating a certain course of actions for a clinical state, but are not as helpful in determining a clinical state for a specific patient. They are difficult to be applied in computer-based systems. The clinician must decide that the patient belongs to a certain clinical state to determine what data must be collected and how they should be interpreted.

GEODE-CM (Guided Entry of Data Elements for Clinical Management) is a project currently under development at the Decision Systems Group. It is a clinical workflow tool which uses clinical guidelines as a framework to manage diagnostic workups and patient care. Clinical problems are divided into clinical management states, and within each state data are collected and decisions are made about appropriate actions or transitions to other states.[2] Each state has a set of associated data, actions, logic (eligibility and transition conditions for entering and leaving the state, and for making assessments and formulating plans), and information resources. Clinical domains, such as management of breast masses, are divided into a number of clinical management states, such as "patient with new mass", "patient with ductal carcinoma in situ", etc. Data for each state are used to determine which diagnostic or therapeutic actions are appropriate for a patient. Some of these data may be entered by the clinician, some come from studies, and some are the results of other diagnostic actions. When the management of the patient changes, a transition to a new state is made, and a new set of data becomes pertinent.

The clinician collects both subjective and objective data from the patient, and other data are retrieved from the stored medical record. Data are used to suggest assessments, such as mass size, age of patient, and breast cancer risk factors all bearing on an assessment of the suspiciousness of a mass for malignancy. Assessments are associated with the state, which are interpretations of findings known thus far. Similarly, assessments suggest plans, in the form of tests and procedures, follow up, etc., or transitions to new management states. Assessments and plans suggested by GEODE-CM may be accepted or altered by the physician.

Most guidelines have references to document the suggestions made. GEODE-CM allows for associated information resources to be attached to any finding, assessment, action, condition, or entire state. These information resources can include literature references, access to decision aids, institutional-specific information, and patient education materials, including multimedia.

Other authors have built computer-based applications that facilitate the implementation of clinical guidelines within certain platform-dependent hospital information systems[3,4]. The idea behind GEODE-CM is different: it uses a component-based architecture, integrating WWW-based tools, CORBA-compliant objects,[5] databases, and other elements to provide its functionality. Components of the GEODE-CM system can be replaced and updated easily if they comply with the CORBA specifications. The system is platform-independent, and has the potential to integrate existing legacy systems.

The first GEODE-CM prototype will be implemented in the Breast Care Center at the National Naval Medical Center in Bethesda and possibly the breast care clinic at the Brigham and Women's Hospital in Fall 1996. It will contain clinical guidelines for assessment and management of breast masses that were developed in those settings.

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